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ABSTRACT

In response to the assertion that reading is a fixed set of processes that can be identified and studied independently of context, a study was initiated based on the following assumptions: that different types of reading (prose comprehension and text search) can be identified and measured, that reading competencies are highly associated with uses for reading, and that reading proficiency can be predicted by the frequency of the use of each type. The objectives of this study, which is in process, are to demonstrate a new methodology for assessing reading skills, to develop a survey instrument to relate materials read to the uses to which they are put, and to construct a reading competencies assessment instrument. The sample population, 25 employees of Hewlett-Packard, have been observed at work. Sample tasks are currently being compiled. Findings thus far include the following: (1) independent sets of reading competencies are developed in relation to particular uses; (2) time spent engaged in reading for a particular use is more important in predicting performance than any other background or performance variable; (3) reading for a particular use does not substitute for other types of reading; and (4) different types of materials require different reading skills. Further research is necessary to replicate these findings. (Appendixes contain the text search processing model, a chart depicting the activities time line, an outline of the briefing for Hewlett-Packard, and a copy of the initial sampling plan.) (LLZ)

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Reading Competencies and Practices

Conceptual Foundations for Competencies and Practices of Reading

Irwin Kirsch and John Guthrie

March 1982

Technical Report #1

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I. Purpose and Conceptual Framework

The purpose of the current research under contract to Army Research Institute is to investigate reading competency in the framework of ethnographic psychology. Within this framework, naturalistic inquiry is joined with scientific experimentation to "unpackage" complex processes required to perform particular tasks. Cross cultural psychologists studying cognition within this framework have demonstrated that different cultures and groups may value different kinds of literacy practices, and that these practices may be incongruent with those taught in schools. Some have suggested that these practices can condition cognitive outcomes and offset demonstrated proficiency on tasks. As a result, these and other researchers have called for studies of literacy in this country that emphasize reading as it is used by particular groups in various contexts.

The concept of "use" in this framework refers to what people do with printed or written language--how they use their knowledge of reading and writing, what materials they frequently engage in and for what purposes. It is the interaction between use and material that operationally defines a reading task and determines the processing demands required for successful performance. Understanding the nature of these processes and how they might be altered as a result of various materials and purposes people have for reading provides a context for developing construct valid tests that will be useful in determining, among other things, the effects of training and experience on associated competencies.

Although it is increasingly recognized that people have different uses for reading, these are generally not seen as being intrinsic to an analysis of reading competencies. The guiding conceptual framework for this study is that reading competencies are highly associated with uses. We suspect that different types of reading can be identified and measured. Also, we suspect that proficiency will be predicted by frequency of use individuals have for each type. Initial evidence in support of this framework has been provided in dissertation research conducted by the principal investigator and will be briefly discussed in a later section of this report.

II. Objectives of the Research

a) Given our conceptual framework, the objectives of this research are to gather information from a sample of adults regarding reading materials and uses to which they are put as a basis for developing a "Competency Assessment System" that can be used to test our hypotheses and in concert, demonstrate a methodology for assessing reading skills that are in contrast to existing methodological perspectives. Components of this system will include: a) a classification scheme for reading materials; b) a classification scheme for uses of reading; and c) an objective rating scale for constructing profiles of processing demands.

b) In addition, this assessment system will result in products or deliverables from the contract proposal. Included are:

1. Reading Activities Survey: A survey instrument will be developed and tested that is designed to yield reliable and valid data regarding not only the materials read but also the uses to which these materials are put and the context in which this reading occurs.

   This instrument will be designed to allow administration in group form taking up to one hour. It will result in a reading record that can be used to compare individuals and groups. By administering the survey to people who are successfully performing in a particular occupation, the reading demands of that occupation could be described in terms of its characteristic written materials, its unique uses, and the quantity of reading required.

2. Experimental Reading Competencies Test: The Competency Assessment System will be applied to constructing an assessment instrument that will have been field tested. The items comprising this instrument will be representative not only of certain processes, but also associated materials, uses, and contexts. Thus, for situations that match those studied, a measure will be available that would be valid with respect to content and construct criteria.

III. Operational Definition of Terms Relating to Study

1. Document:
   consists of printed or written information of varying length that occurs in a variety of formats and media. These media include but are not limited to newspapers, magazines, books, and computer terminals. They may include prose or connected discourse, graphically displayed information, or some combination of each.

2. Purpose for Reading:
   is a directed goal that is taken with a particular document. It incorporates the information demands of the reader and thus will allow the reader to determine when to terminate the reading activity.

3. Use of Reading:
   is closely associated with the term purpose in that it involves carrying out a directed goal. However, it is more generalized since it refers to a frequently repeated action or practice in reading a certain type of document for a certain purpose.

4. Reading Task:
   consists of a question or goal statement and a document over which the question is asked. In this study, the goal statement will reflect the actual use(s) made of the document.

5. Content Validity of Tests:
   focuses on the substance of a test. It is generally evaluated by sub-

ject matter experts in terms of the extent to which the items selected match the informational domain from which they were derived.

6. Construct Validity:
   a test has construct validity to the extent that performance can be accounted for in terms of specified cognitive processes. An assessment of this, we believe, requires a statement of a test's purposes in terms of processes and a description of the relationship between performance and its demands on these processes.

7. Reading Competence:
   a capability demonstrated by performance on a class of reading tasks that requires cognitive processes defined by an information processing model. Different competencies are established on the basis of these information processing models and their statistical independence.

IV. Data Relevant to Objectives

Although it is increasingly recognized that people have different uses for reading, these are generally not seen as being intrinsic to an analysis of reading competencies. The dominant view of literacy has been that of a unitary trait representing a fixed set of processes that can be identified and studied independent of their context of use. It was proposed that the variations in reading tasks people frequently encounter in work and leisure environments is not well accounted for by a general processing model of reading. Rather, that reading could more appropriately be thought of in terms of more than one type; that use could give use to sets of competencies that can be learned and expressed independently of each other.

General processing model for reading

Several investigators have proposed processing models to account for reading. As Danks and Fears (1979) noted, a general model of reading that is commonly assumed

> proposes that print is first divided into a phonological code that has most of the characteristics of a verbal oral input. This code is then comprehended by the usual routines of language comprehension that the child has developed for speech. (p. 89)

This view is in line with those of Goodman (1976) and Smith (1971) who states, "Reading is an aspect of language, only superficially different from the comprehension of speech." It is also consistent with Sticht's (1978) developmental model of literacy.

Proposed types of reading: prose comprehension and text search

The general model of reading assumed by these researchers focuses on prose materials that are of reasonable paragraph length typical of the kind employed

in textbooks and other everyday written communications. This format involves a type of reading that has a counterpart in our oral language processing system. For example, we can either read a story or listen to someone read the same story. We may read a newspaper editorial or listen to someone recite an editorial comment on television. However, there are materials that people frequently encounter that do not have an obvious counterpart in our oral language system. We don't normally listen to someone read a table, although we may read a table to ourselves for information. Similarly, we may read a reference manual to locate a specific fact but we don't listen to someone read a manual.

Often these materials are associated with a particular use. Reading of connected discourse, for example, is frequently connected with a general goal like "learn the important points" that is often determined during the course of reading and is based largely on the content of the passage rather than some informational demand external to it. The competency associated with successful performance on tasks consisting of this type of document and use will be referred to as prose comprehension in this study.

In contrast, materials that involve graphically displayed information by itself or in combination with connected discourse frequently are associated with a different use. Here the goal frequently involves a selective search to identify specific information that is used to answer an immediate question. Activities associated with this search behavior are not unlike those associated with general models of problem solving in which successful performance entails setting goals, selecting actions to achieve these goals, and interpreting information from a display (Simon, 1975). Frequently, the information obtained from this activity is not remembered or well integrated into the reader's knowledge base. The competency associated with successful performance on tasks consisting of this type of document and use will be referred to as "text search."

It is recognized that each of these uses for reading may be applied to the full range of materials depending on particular contexts. For example, someone may search a segment of prose for specific information or they may learn a set of directions or procedures in a manual for later use. As Sticht (1978) has noted, these uses are differentially associated with training and job environments in the military.

Study of Text Search and Prose Comprehension

As part of a study conducted with employees of the C&P Telephone Company, an attempt was made to better understand the nature of text search tasks and to test the hypotheses that they were of a different type than those typically associated with prose comprehension. This consisted of two activities. The first involved constructing an information processing model to account for text search tasks. The second was to measure the independence of performance on tasks associated with each type. A brief description of these efforts is provided.

Processing model for text search. Through surveying and interviewing employees and supervisors, information was gathered pertaining to text search reading tasks. By asking users what information they sought in particular situations, which sections of a particular document they attended to, how they knew where to look, and how they knew when to stop reading, a model was generated. This model is provided in Appendix A.

In constructing this model it was assumed that the reader has a specific goal which takes the form of information to be located and extracted. The goal or informational need with these employees was generally external, coming from a customer or supervisors; although it could be self-generated. In this particular study, the information required to satisfy the goal was located in a particular section of text that was embedded in a larger collection of material such as a book or manual.

The model has two stages. First, the reader must define the information needs and find the section in the material in which the critical information is located. This involved using a detailed index. The operations assumed to underlie this comprise Stage I. Next, the reader must find the information within the identified section or page that is to be extracted and do so. Stage II of the model contains operations assumed needed to accomplish this.

Measuring text search and prose comprehension. Using this model, 11 text search tasks were constructed that seemed to reflect the operations identified in each of Stage I and Stage II of the model. Five of these tasks were taken from a reference manual frequently used by service representatives in the telephone company. The remaining six tasks were taken from other reference type materials that were not used by telephone employees studied. Reading tasks corresponding to prose comprehension were selected from the National Assessment of Educational Progress and Nelson Denny Reading Tests. Seven passages consisting of one or more paragraphs of connected discourse were selected. Each passage had two or more multiple choice items for a total of 20.

Relationship Between Competencies and Uses of Reading

Evaluating the relationship between competencies and uses for reading involved administering the sets of text search and prose comprehension tasks to a sample of 42 telephone company employees consisting of service representatives (26), directory compilation clerks (13), service order writers (2), and a service order typist. Uses of reading were quantified in terms of volume of reading activities. Volume of reading associated with each domain of tasks was estimated through structured interviews. Each person was asked to estimate the amount of time they spent reading particular materials and whether this reading was similar to one or other set of performance tasks. Based on their responses, estimates were obtained for each person regarding the amount of time spent reading each day corresponding to each type of task. In addition, each person provided information regarding their age, education, and job experience.

It was expected that proficiency with prose reading tasks would not be easily predicted by proficiency with text search tasks. Also, it was expected that performance on either set of tasks would not be predictable by any of the selected background variables. Rather, it was thought that performance within each domain of tasks would be predictable by the quantity of use for that type of reading.

Independence of Prose Comprehension and Text Search Tasks

The major finding of this investigation which is followed up in the present contract was that our domains of tasks were uncorrelated. Table 1 shows that performance on prose comprehension and text search correlated at .26 which with our size sample was not significantly different from zero. Also shown here is that age, education, and job experience were not associated with performance or reading volume.

Insert Table 1 about here

The lack of association between prose reading and text search tasks was taken as an indication that these domains of tasks were measuring different skills in this sample. As Carroll (1981) has noted, when performance on two variables are uncorrelated, this is an indication that the underlying processes are likely to be different, whereas, one does not know what to conclude about underlying processes when two variables show significant correlations. Certainly these two types of reading share some of the same processes including decoding and vocabulary. However, the lack of association indicates these tasks differ in important ways presumably captured by the processing model.

Use as an Important Predictor of Competence

While proficiency among text search and prose comprehension tasks was uncorrelated, time spent reading for a particular goal was significantly related to the ability to perform tasks associated with that goal. As Table 1 reveals, time spent engaged in reading that was similar to text search tasks was correlated with performance on that domain of tasks ($r = .55$) while it was uncorrelated with competence in performing prose reading tasks ($r = .01$). Similarly, time spent reading connected discourse to acquire information predicted performance with prose comprehension tasks ($r = .64$) while being uncorrelated with text search task ($r = .08$). Also time spent reading prose materials was not associated with time spent engaged in text search ($r = .12$).

The predictive power of use as estimated by time spent reading for a particular goal can be seen within a regression framework. Table 2 shows summaries from two regression analyses in which performance on prose comprehension and text search tasks were each dependent measures. The "F" values opposite each Beta is an indication of the incremental contribution of each variable by assuming it was added last to the equation and corresponds to Darlington's (1968) view of importance. The only significant "F" in each

regression was for the variable indicating the amount of time spent reading that was associated with a given domain of tasks. Time spent reading connected discourse for information was the most important variable in predicting proficiency with prose reading tasks. Similarly, time spent engaged in text search was the most useful variable in predicting performance with text search tasks.

Insert Table 2 about here

Conclusion

It would appear from these analyses that people can develop independent sets of competencies that relate to particular uses they have for reading. The skills needed to perform prose comprehension tasks do not appear to be the same as those needed to perform text search tasks. Further, time spent engaged in reading for a particular use is more important in predicting performance than any other performance or background variables measured in this study. Also, reading for a particular use did not substitute for other types of reading. Prose comprehension and text search for this sample were distinct from each other both in terms of time spent engaged in each type of reading and in terms of demonstrated competency in performing respective tasks. Additional research is needed to replicate these findings and to describe additional uses people have for reading and their association with particular competencies.

V. Current Activities

Although the contract is dated 1 August, 1981, work on this project did not officially begin until the middle of September. This was due to the fact that the contract was not received and signed by the International Reading Association (IRA) until the first week of September 1981. Since the contract reimburses IRA for expenses, expenditures could not be approved until the contract had been received and signed. Activities engaged in since that time have generally followed the time line described in Table 5 of the research proposal (shown in Appendix B of this report) and will be summarized here.

1. Gaining Entry

A. Organization: Several organizations within easy commuting distance of IRA were contacted and the proposed research described. Follow-up letters and visits were made to persons who demonstrated an initial interest in the project. Emphasis was placed on organizations with several hundred employees working in a full range of occupational categories.

Based on these efforts initial approval for the conduct of the study

was granted by the Analytical Instrument Division of the Hewlett-Packard Corporation. The company is located in Avondale, Pennsylvania which is approximately 12 miles from IRA. Each division within H/P functions similar to an independent business having its own research and development labs, manufacturing facilities, as well as marketing and administrative staffs. To accomplish their objectives, this division employs approximately 800 persons in various job categories that include: managers, professionals, technicians, office and clerical, skilled, semi-skilled and service. Specific jobs within these categories are organized around functional areas each having a manager who is directly responsible to the Division General Manager.

A briefing was prepared that explained the nature of the project, the role of the organization, the resources needed, and the expected outcomes. An outline of this briefing is contained in Appendix C. The briefing was presented to the Division General Manager and the functional managers and all questions concerning the project were addressed. Final approval was granted, although some concern was expressed about the use of employee time during the current economic recession.

B. Selecting a Sample: Conversations were held with the training supervisors and other personnel representatives within H/P. They provided access to division reports dealing with the numbers of personnel employed in various job categories along with general descriptions of each job. From these reports an initial sampling plan of 100 persons was constructed (Appendix D). It was representative of the jobs and occupational categories existing at H/P. Personnel representatives were given this list and they provided names of 100 persons that held the job outlined.

Initial contact with the employees was done through the company newsletters based on the recommendations of the Training Supervisor. In it we described the project and the internal support for it, and asked for persons who would be willing to participate. Ten persons responded whose names matched those on the list provided by personnel. These persons were contacted and comprised our initial sample for case studies.

2. Case Studies

The second major activity engaged in during the period covering this progress report was to begin collecting observational data on reading events occurring in work and home environments. To date, we have observed persons at work. We have not made home visits and are unsure about doing so based on tentative feedback from several persons. If we are unable to visit the homes, we will obtain relevant information through interviews and self-reports.

To date, we have observed ten persons in seven job categories. These include the division manager for two hours; one functional or area manager for two hours; one personnel representative for three hours; two quality assurance engineers for eight hours each; an analytic chemist for seven hours; a computer programmer for eight hours; a scheduler for six hours and two product assemblers for three hours each.

The purpose of these observations is to gather information pertaining to reading tasks frequently engaged in by these persons. These tasks reflect a particular document and particular uses made of it. We expect that persons involved in different jobs will have need to read same or similar materials but their use of them will be different. For example, one of the quality assurance engineers is responsible for generating a manual to be used with a particular product or instrument. His use of reading relating to that manual is expected to be different from that of personnel involved in marketing and servicing that instrument. Other documents and uses may be specific to particular jobs.

At the present time we have begun to compile tasks found in our observation notes. A sample of some of the difficult tasks is described here.

Reading Tasks

Task #1

Document: Thirty-eight-page report consisting almost totally of connected discourse. Involved highly technical vocabulary associated with a particular product line--a new integrator. This document was a proposal for development of a new integrator.

Use: Reader was given this document and asked to review and evaluate its content. This evaluation entailed understanding and some judgment as to its internal coherence and logic. In addition, the reader had to apply external criteria that involved some judgment as to: a) whether and how product met projected demands and resources and b) its political and market acceptability.

Task #2

Document: Computer generated reports consisting of numerous pages of tables each corresponding to a particular assembly or piece of equipment that is manufactured as part of an instrument. Information in each table consists of words and numbers relating to current availability and projected needs.

Use: Individual makes an operational decision based on information

contained in each table. The basic decision consists of whether to initiate a work order for manufacturing assemblies to meet projected demands or whether current levels are sufficient. This leads to initiating of other reading tasks.

Task #3

Document: Operators Reference Manual for a computer program developed by Hewlett-Packard. One page titled "The Analyze Command: reprocessing data" was read by a programmer.

Use: The reader's goal was to find out what the program section was doing, i.e., how it operated on data. The section was comprehended totally and the parts relevant to a new program being written were identified and analyzed. Such comprehension and analysis of program segments was a highly frequent reading task.

Task #4

Document: A computer program that was under revision was read. The document was a list of specifications for commands and the symbols used to represent them.

Use: The reader searched page eight of this program to locate a word (cartridge) which had to be altered in the new version. Each occurrence of the word was formed and changed. This is a frequent editorial procedure.

VI. Six-Month Projection

During the next six months we anticipate completing observations on a total of 25 employees, as indicated in the time line of the proposal. At this point we are conducting the observations at work and remain uncertain about gaining access to homes. However, we do not anticipate this changing the nature of our study. We feel we will be able to get needed information and samples of materials through structured interviews and self-reports. Interviews can be conducted during employee breaks, lunch hour, or before or after work.

Also during the next six months we plan to begin to develop our classification system for uses and materials. Organizational frameworks for these systems are undeveloped at this time. However, we will review existing descriptions and criteria and evaluate them with respect to what we observe.

Table 1

Zero Order Correlations among Literacy Indices

		1	2	3	4	5	6	7
Age	1	--						
Education	2	-.39	—					
Job Experience	3	.43*	.25	--				
Prose Reading	4	.04	.17	-.08	—			
Text Search	5	-.11	.23	-.11	.26	--		
Min./Day Search	6	.11	.21	-.22	.64*	.08	--	
Min./Day Text Search	7	-.22	.04	.01	.01	.55*	.12	--

n = 42
* = $p \leq .01$

Table 2

Summary of Multiple Regressions with All Predictors in the Equation

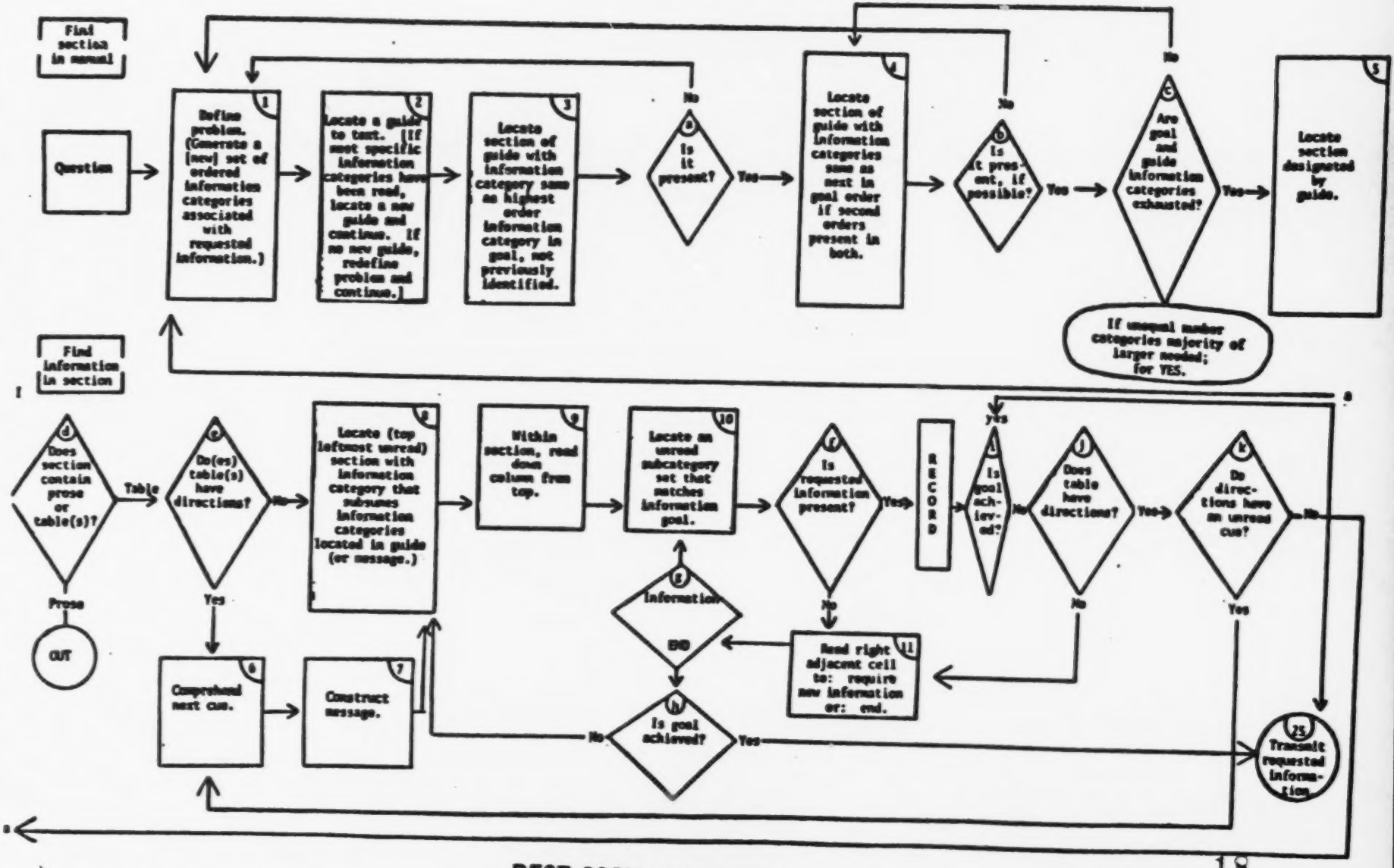
Dependent Variable: Text Search		
	Beta	F
Age	.12659	.633
Education	.19699	1.915
Job Experience	-.12029	.610
Prose Reading Min./Day	.28304	2.696
Prose Min./Day	-.10502	.331
Text Search Min./Day	.55285	16.479*

Dependent Variable: Prose Reading		
	Beta	F
Age	-.07938	.269
Education	-.02184	.024
Job Experience	.12198	.685
Text Search Min./Day	.25955	2.696
Prose Min./Day	-.07112	.202
Prose	.64605	22.499*

* = $p \leq .01$

Appendix A: Text Search Processing Model

A Processing Model for Text Search


Find section in manual
Question
1 Define problem. (Generate a [new] set of ordered information categories associated with requested information.)
2 Locate a guide to text. [If most specific information categories have been read, locate a new guide and continue. If no new guide, redefine problem and continue.]
3 Locate section of guide with information category same as highest order information category in goal, not previously identified.
a Is it present?
No
Yes
4 Locate section of guide with information categories same as next in goal order if second orders present in both.
b Is it present, if possible?
No
Yes
c Are goal and guide information categories exhausted?
No
Yes
If unequal number categories majority of larger needed; for YES.
5 Locate section designated by guide.
Find information in section
d Does section contain prose or table(s)?
Table
Prose
CUT
e Do(es) table(s) have directions?
No
Yes
6 Comprehend next cue.
7 Construct message.
8 Locate (top leftmost unread) section with information category that subsumes information categories located in guide (or message.)
9 Within section, read down column from top.
10 Locate an unread subcategory set that matches information goal.
f Is requested information present?
Yes
No
RECORD
g Information END
h Is goal achieved?
No
Yes
i Is goal achieved?
Yes
No
j Does table have directions?
Yes
No
k Do directions have an unread cue?
No
Yes
11 Read right adjacent cell to: require new information or: end.
25 Transmit requested information

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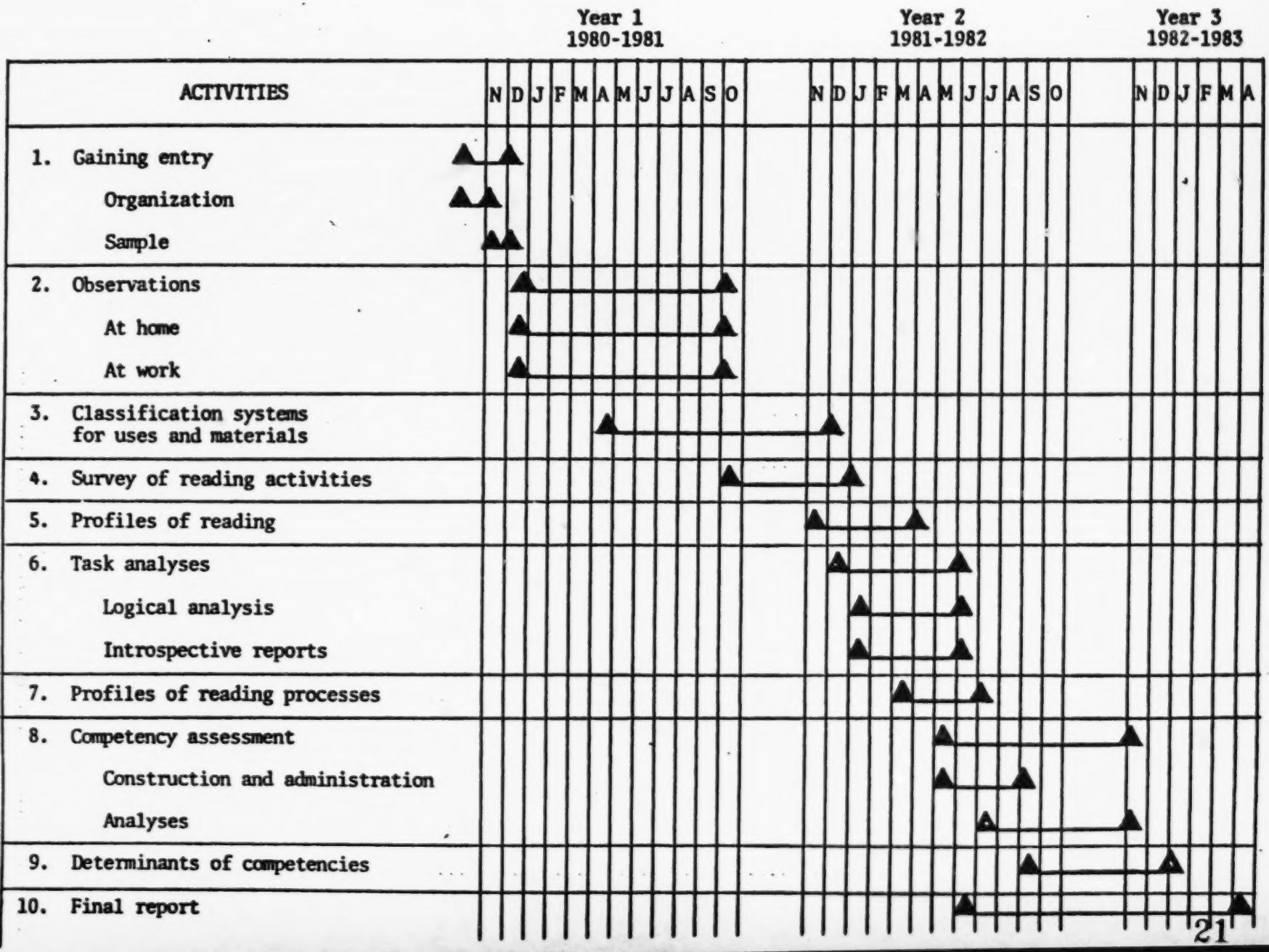
Appendix B: Time Line for Activities

Table 5

Time Line of Activities in the Proposed Study



Appendix C: Briefing for Hewlett/Packard

Briefing for

Hewlett-Packard Functional Managers

Occupational Reading Study

Personnel

John T. Guthrie, Project Director

Irwin S. Kirsch, Principal Investigator

Alexis N. Gordon, Research Assistant

Rationale

Literacy is a concept closely tied to Western values and social thought.

It has been conceptualized as:

1. Basic human rights
2. Attitude
3. Tool
4. Service

Value and volume of reading and training in the workplace.

1. 87% of persons employed in early 1970s reported reading to be a necessary part of their job.

2. Mean time spent reading each day was 141 minutes, or 29% of 8-hour working day.

3. This was estimated to cost employers 362.6 billion in 1976 dollars, or 23.9% of GNP.

4. This investment was seen to be rising along with the size of the white collar work force, and to extend into the area of training.

   --Business and industry allocate more than $30 billion in education and training annually.

   --In any given day, 30,000 of AT&T's 1,000,000 employees are occupied in various training classes.

--What is the nature of this reading for which we are so heavily invested?

--How is it similar to and different from other kinds of reading people normally engage in?

Purposes

1. Describe the range of materials read or processed in various job settings.
2. Identify the uses or purposes for reading these materials.
3. Conduct an analysis of the processes that interact with materials and uses.
4. Measure reading proficiencies related to these materials and purposes.

Method

1. Survey (structured interview) 100 selected employees from Hewlett-Packard.
2. Conduct case studies with 25 employees selected from initial sample.
    a) Time frame: approximately 9 months
    b) Involve 4-6 interviews/person: on the job
       " " " " at home
    c) Procurement of frequently occurring reading materials.
3. Development and construction of reading competency test.
4. Administration of proficiency measure to sample of employees.
5. Identification of determinants of (job related) reading competencies.

Benefits

1. Scientific: Fill knowledge gap regarding functional contexts for reading.
2. Practical:
   a) General: Methodology for developing valid personnel assessment measures.
   b) Hewlett-Packard: Direct implications for assessment and training systems for written communications.

Summary of Needs

Activity	Personnel	Time Frame
1. Preliminary survey of activities	100 selected employees for 45 minutes	To be conducted during first 2 months of project
2. Case studies	25 employees, 8-12 hours/person in work and home settings	To take place during 9-month period following survey
3. Administration of Proficiency Measure and Activity Survey	100 employees for approximately 90 minutes	To be administered at end of second year

Table 5

Time Line of Activities in the Proposed Study

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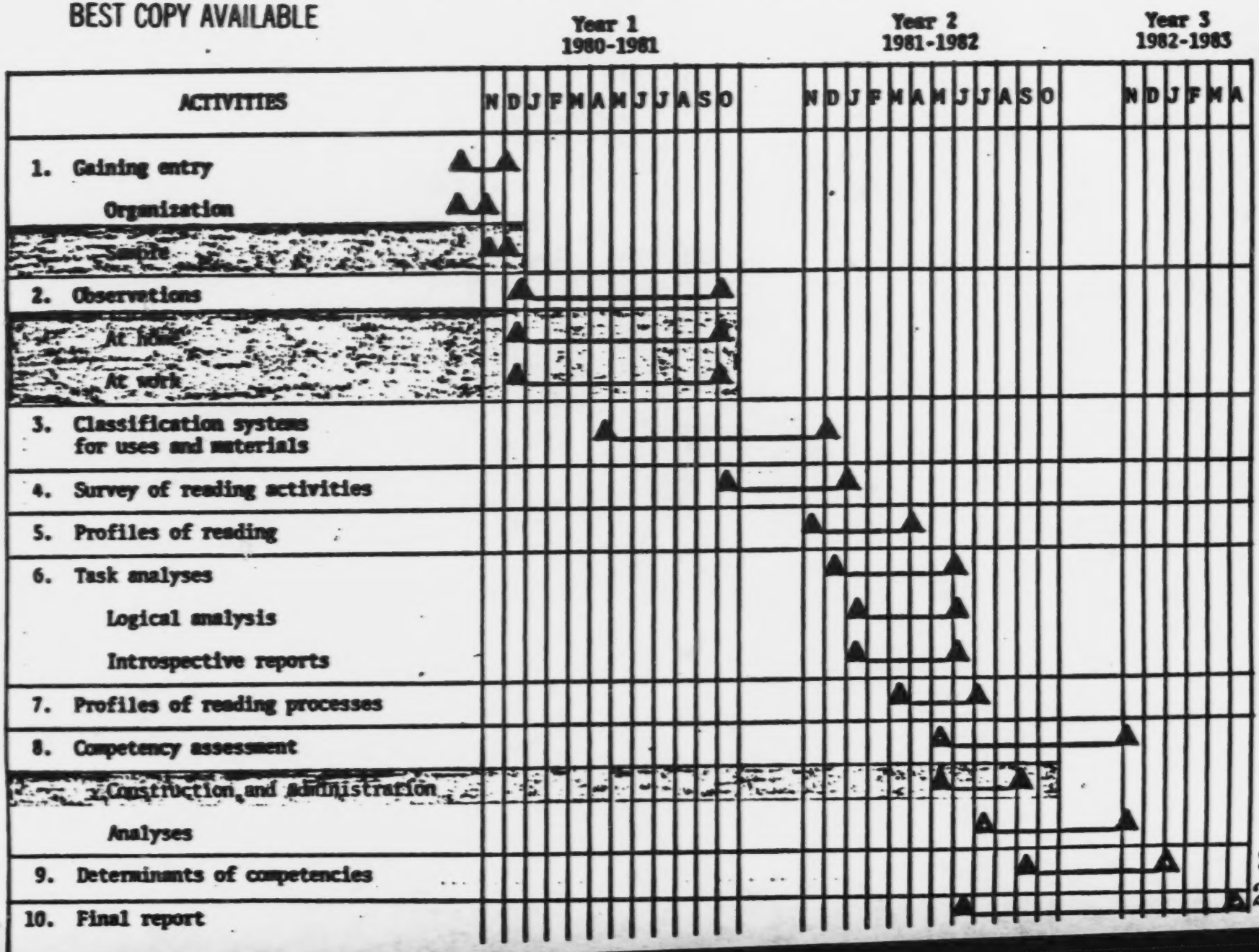

Appendix D: Initial Sampling Plan

INITIAL SAMPLING PLAN
OCCUPATIONAL READING STUDY

	SUMMARY	NUMBER OF PERSONS
Level A	Official Managers	28
B	Professionals	25
C	Technicians	10
D	Office/clerical	9
E	Skilled	8
F	Semi skilled	18
G	Service	2
	TOTAL	100

Level A Officials Managers

1. Functional Manager (7)
   Next level manager from each functional area (7)
   Next level (supervisor) from each functional area 14

Total = 28

Level B Professionals

Engineers:	Quality assurance	(3)			
	R & D	(3)			
	Marketing	(3)			
	Production	(3)			
Personnel rep	(1)	Estimator	(1)	Scheduler	(1)
Systems analyst	(1)	Marketing asst.	(1)	Buyer	(1)
Accountant	(1)	Tech. writer	(1)	Exec. sec.	(1)
Programmer	(1)	Graphics Design	(1)		

Total = 25

Level C Technician

Technician I, II	(3)
Technician III	(3)
Drafting I, II, IV	(1)
Photographer	(1)
Technical illustrator	(1)
P. C. designer	(1)

Total = 10

Level D Office Clerical

Clerk	(1)
Data entry	(1)
Typewriter	(1)
Tech. writer associate	(1)
Program trainee	(1)
Personnel assistant	(1)
Switchboard operator	(1)
Secretary	(1)
Computer Operator	(1)

Total = 9

Level E Skilled

Production	(3)
Guage inspector	(1)
Sheet metal worker	(1)
Machinist	(1)
Tool/die	(1)
Press operator	(1)

Total = 8

Level F Semi-Skilled

Production I, II	(8)
Material handler	(8)
Bindery	(1)
Apprentice	(1)

Total - 18

Level G Service

Building service	(1)
Food service	(1)

Total = 2

READING COMPETENCIES AND PRACTICES

Technical Reports

Kirsch, I., & Guthrie, J. Conceptual foundations for competencies and practices of reading. Technical Report #1, March, 1982, International Reading Association.

Kirsch, I., & Guthrie, J. Case studies of reading in a high technology corporation. Technical Report #2, August, 1982. International Reading Association.

Kirsch, I., & Guthrie, J. Prose comprehension and text search as a function of reading volume. Technical Report #3, August, 1982, International Reading Association.

Guthrie, J., & Seifert, M. Profiles of reading acitivity in a community. Technical Report #4. October, 1982, International Reading Association.